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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/997,650	11/28/2001	Julia C. Duncan	DUNCAN 3-10-40	7404

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EXAMINER

HOGANS, DAVID L

ART UNIT	PAPER NUMBER
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2813

DATE MAILED: 11/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/997,650	DUNCAN ET AL.	
	Examiner	Art Unit	
	David L. Hogans	2813	<i>mw</i>

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 August 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-12 and 15-17 is/are pending in the application.
- 4a) Of the above claim(s) 1-8, 13, 14 and 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-12 and 15-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 November 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the Request for Reconsideration filed on August 11, 2003.

Status of Claims

Claims 9-12 and 15-17 are pending. Claims 1-8, 13, 14 and 18-20 have been cancelled.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 9, 10 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 00/57446 to Jones et al.

In reference to Claim 9, Jones et al. teaches:

- forming a semiconductor substrate (100) made of silicon (See page 6 lines 3-4)
- forming an active region (300; i.e. - a light emitting diode) over the semiconductor substrate (See Figure 2 and pages 6-8 lines 03-13; furthermore noting that an active region is any region that introduces gain or has a directional function)

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- forming an indium doped dielectric layer (410) over the semiconductor substrate with an indium concentration ranging from 1 mol weight percent to 15 mol weight percent (See page 6 lines 12-20 and Figure 2)

In reference to Claim 10, Jones et al. teaches:

- forming an indium doped interlevel dielectric (410) (See Figure 2)

In reference to Claim 15, Jones et al. teaches:

- forming an indium doped dielectric layer (410) via a chemical vapor deposition process (i.e. – co-evaporation) (See page 7 lines 15-17)

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 9, 11 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by 6,195,191 to Osenbach et al.

In reference to Claim 9, Osenbach et al. teaches:

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- forming a semiconductor substrate (24) made of lithium (See column 7 lines 8-12; also noting Applicant's own specification, page 10 lines 8-10, that describes a semiconductor substrate that may be comprised by a material with a bandgap less than 4 electron volts)
- forming an active region (15 and 25; i.e. - a waveguide, modulator, attenuator or optical switch) over the semiconductor substrate (See Figures 1 and 2 and columns 3-7 lines 25-30; furthermore noting that an active region is any region that introduces gain or has a directional function)
- forming an indium doped dielectric layer (13 and 23) over the semiconductor substrate with an indium concentration of 5 mole percent indium oxide (See column 5 lines 10-40, column 7 lines 5-30 and Figures 1 and 2)

In reference to Claim 11, Osenbach et al. teaches:

- forming an indium doped silicon dioxide layer (See column 5 lines 20-27)

In reference to Claim 12, Osenbach et al. teaches:

- an indium doped oxide layer having a thickness of at least 300 nm to 1500 nm (column 5 lines 30-40)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/57446 to Jones et al.

Incorporating all arguments of Claim 9 and noting that Jones et al. discloses the claimed invention except for forming an indium doped silicon dioxide layer (Examiner notes that Jones et al. forms an indium doped silicon monoxide layer at page 6 lines 12-20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to make an indium doped silicon dioxide layer, since it has been held to be within the general skill of a worker in the art to select a known material based on its suitability for its intended use. *In re Leshin*, 125 USPQ 416 (CCPA 1960)

Furthermore, the specification contains no disclosure of either the critical nature of the claimed process steps or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen process steps or upon another variable recited in a claim, the Applicant must show that the chosen process steps are critical. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990)

2. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/57446 to Jones et al.

Incorporating all arguments of Claim 9 and noting that Jones et al. discloses the claimed invention except for forming the indium doped dielectric layer to a thickness ranging from about 400 to 1200 nm (Examiner notes that Jones et al. forms an indium doped dielectric layer to a thickness of 50 nm at page 6 line 12). It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the indium doped dielectric layer to a thickness of 400 to 1200 nm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (CCPA 1955)

Furthermore, the specification contains no disclosure of either the critical nature of the claimed process steps or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen process steps or upon another variable recited in a claim, the Applicant must show that the chosen process steps are critical. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990)

3. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/57446 to Jones et al. in view of Publication No. JP2001-195789 to Kyo et al.

Incorporating all arguments of Claim 9 and noting that Jones et al. fails to explicitly teach an indium doped dielectric layer using a PVD process employing a target that comprises silicon dioxide and indium.

However, JP2001-195789 to Kyo et al., in column 2 lines 10-20, teaches forming an indium doped oxide layer via a PVD process with a target comprised by silicon dioxide, indium and chalcogen treated zinc. Further, JP2001-195789 teaches that the indium doped silicon dioxide protective film is formed without cracks, thereby increasing production efficiency.

It would have been obvious to one of ordinary skill in the art to modify Jones et al. by incorporating a PVD process with a target comprised by silicon dioxide, indium and chalcogen treated zinc, as taught by JP2001-195789, to form an indium doped silicon dioxide protective film without cracks, and, thereby increase production efficiency.

4. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 00/57446 to Jones et al. in view of 5,397,920 to Tran.

Incorporating all arguments of Claim 9 and noting that Jones et al. fails to explicitly teach a pressure ranging from 4 to 8 mtorr, a radio frequency ranging from 50

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to 550 watts and a gas flow rate ranging from 10 to 35 sccm when forming an indium doped dielectric layer.

However, Tran, in column 6 lines 34-49 and column 7 lines 29-32 and lines 51-57, teaches forming an indium doped oxide layer via a pressure of 7 mtorr, a radio frequency of 300 watts and a gas flow rate of 30 sccm. Further, Tran teaches that these process limitations give a film deposition rate of 1 angstrom per second. (See column 7 lines 53-57) Furthermore, Tran's use of such processing conditions shows the formation of an oxide layer to be functional.

It would have been obvious to one of ordinary skill in the art to modify Jones et al. by incorporating a pressure of 7 mtorr, a radio frequency of 300 watts and a gas flow rate of 30 sccm to form an indium doped oxide, as taught by Tran, to form the above film at a deposition rate of 1 angstrom per second. Furthermore, Tran's use of such processing conditions shows the formation of an oxide layer to be functional.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over 6,195,191 to Osenbach et al. in view of 6,051,884 Papadas.

Incorporating all arguments of Claim 9 and noting that Osenbach et al. fails to explicitly teach an indium doped dielectric layer used as an interlevel dielectric.

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However, Papadas, in column 4 lines 1-6, teaches an indium doped oxide used as an interlevel dielectric (80). Furthermore, Papadas teaches that indium doped oxide acts as an insulator, thereby preventing accidental electrical connections. (See column 3 lines 25-30)

It would have been obvious to one of ordinary skill in the art to modify Osenbach et al. by incorporating an indium doped interlevel oxide layer, as taught by Papadas, to form an insulating layer between multiple metal levels.

6. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over 6,195,191 to Osenbach et al. in view of Publication No. JP2001-195789 to Kyo et al.

Incorporating all arguments of Claim 9 and noting that Osenbach et al. fails to explicitly teach an indium doped dielectric layer using a PVD process employing a target that comprises silicon dioxide and indium.

However, JP2001-195789 to Kyo et al., in column 2 lines 10-20, teaches forming an indium doped oxide layer via a PVD process with a target comprised by silicon dioxide, indium and chalcogen treated zinc. Further, JP2001-195789 teaches that the indium doped silicon dioxide protective film is formed without cracks, thereby increasing production efficiency.

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It would have been obvious to one of ordinary skill in the art to modify Osenbach et al. by incorporating a PVD process with a target comprised by silicon dioxide, indium and chalcogen treated zinc, as taught by JP2001-195789, to form an indium doped silicon dioxide protective film without cracks, and, thereby increase production efficiency.

7. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over 6,195,191 to Osenbach et al. in view of 5,397,920 to Tran.

Incorporating all arguments of Claim 9 and noting that Osenbach et al. fails to explicitly teach a pressure ranging from 4 to 8 mtorr, a radio frequency ranging from 50 to 550 watts and a gas flow rate ranging from 10 to 35 sccm when forming an indium doped dielectric layer.

However, Tran, in column 6 lines 34-49 and column 7 lines 29-32 and lines 51-57, teaches forming an indium doped oxide layer via a pressure of 7 mtorr, a radio frequency of 300 watts and a gas flow rate of 30 sccm. Further, Tran teaches that these process limitations give a film deposition rate of 1 angstrom per second. (See column 7 lines 53-57) Furthermore, Tran's use of such processing conditions shows the formation of an oxide layer to be functional.

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It would have been obvious to one of ordinary skill in the art to modify Osenbach et al. by incorporating a pressure of 7 mtorr, a radio frequency of 300 watts and a gas flow rate of 30 sccm to form an indium doped oxide, as taught by Tran, to form the above film at a deposition rate of 1 angstrom per second. Furthermore, Tran's use of such processing conditions shows the formation of an oxide layer to be functional.

Response to Arguments

8. Applicant's arguments with respect to claims 9-12 and 15-17 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Hogans whose telephone number is (703) 305-3361. The examiner can normally be reached on M-F (7:30-4:30).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (703) 308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

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October 8, 2003